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AMTS Consortium LLC
Telesaurus Holdings GB LLC
Intelligent Transportation Wireless LLC

www.telesaurus.com

Nationwide spectrum & solutions for ITS & environment

Berkeley California

Ex parte presentation

July 20, 2007

Marlene Dortch
FCC, Office of Secretary
445 12th Street, SW
Washington, DC 20054

Re: WT 06-49, LMS-M NPRM:

Why LMS-M must be maintained for Intelligent Transportation Systems ("ITS"), and no rules changes made, including no reduction in power or time of use.

Supplement to the undersigned's 7.2.07 filing:

US public safety requirements for ITS wireless: as described by US DOT and representatives of US public safety and ITS agencies. Attached documentation.

The Telesaurus LLCs (listed above) herein address the above-listed topic: this was among the topics addressed in the LLCs' 7.2.07 ex parte written presentation in this docket (the "7.2.07 Presentation"), by referencing a summary paper of their overall plan for wide-area ITS wireless in the US based upon their LMS-M licenses. However, to keep that presentation short for FCC consideration,[1] it did not include much of the following.

As shown in the attachments hereto, ITS wireless is essential for US public safety. The attachments summarize principal reasons for this. The 7.22.07 Presentation attached a paper that described specific applications of ITS wireless based on LMS-M that will be provided, in accord with developing US and International ITS standards. These described specific applications are fully consistent with, will largely fulfill, and will extend, the more general goals and programs of the US DOT and the US public safety and ITS community reflected in the attachments below.

[1] Upon advice of senior FCC staff, the Telesaurus LLCs understand that FCC staff generally do not consider presentations that take over a half hour. The Telesaurus ex parte presentations are designed accordingly. In recent months, the Telesaurus LLCs asked numerous times (in writing and orally) for equal time in personal presentations to the extensive accumulated time accorded to Progeny and the Part 15 Coalition. This was not granted, but FCC staff advised that Telesaurus written presentations would be considered.

In addition to the attached information regarding the need for ITS, including ITS wireless, in US public safety services, the wide-area ***location*** functions of LMS-M-based ITS wireless is also critical for needed augmentation and back-up of GPS in US "Position, Navigation, and Timing" infrastructure, as indicated by the US PNT Committee in their website,[2] and the Telesaurus LLCs in their website--[3] and PNT, in turn, is increasingly essential to the safety and efficiency of US public safety, infrastructure, and enterprise, as these sites describe.

Far from LMS-M location service being "obviated" and Progeny asserted as a basis to obtain this NPRM, it is the opposite: wide-area terrestrial multilateration augmentation of GPS is clearly essential. Location of vehicles and related communications—just as the Commission established as the core LMS-M services—are the essential wide-area ITS wireless services.

From an Interview in the *European Journal of Navigation*, Volume 4, Number 4, September 2006, as cited in a study for the FAA, "White Paper, GPS Backup for Position, Navigation and Timing," August 22, 2006, by Aviation Management Associates, Inc.: [4]

> Dr. Brad Parkinson, considered the father of GPS, is certainly one of the most knowledgeable scientists regarding GPS, its performance and future improvements. In a recent interview for the European Journal of Navigation, he responded to a direct question on interference:
>
> ". . . *I am a supporter of having a backup radio navigation system*, and the only backup system I can see is Loran [he is not considering LMS-M once developed] And I can see further that GPS helps Loran or Loran helps GPS. I think that's a great idea. It is mutually aiding, depending on the type of integration. One of the fundamental reasons that I have come back to this is that it is a deterrent. Because a terrorist would probably not decide to jam GPS when he has the recognition that we have Loran as a backup, which is a very difficult thing to jam. . . ." [5] [6]

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[2] Go to: http://pnt.gov/policy/.

[3] Go to: http://web.mac.com/warrenhavens/iWeb/Site 2/ITS Location-1.html and http://web.mac.com/warrenhavens/iWeb/Site 2/ITS Location-2.html.

[4] Copy at: http://www.loran.org/news/GPS-Backup-Released.pdf.

[5] Compared to Loran including enhanced Loran, LMS-M-based wide-area pseudolite multilateration networks as Telesaurus plans (see our website) will provide more accuracy (closer spaced fixed sites, and other reasons), especially for Intelligent Transportation applications; more robust backup (more sites and redundancy, less points of failure; multiple frequencies and modulation and built-in anti-jam mode); its cost will not be borne by the government; and it will be enhanced along with the progressive augmentations of the entire ITS wireless network infrastructure as its traffic increases.

[6] Besides backup of GPS, discussed above, terrestrial radiolocation augmentation of GPS is needed for increased accuracy, better coverage in urban and rural canyons and indoors, quicker location fixes (for many constant-tracking applications), and a more robust, spectrum-efficient and integrated wireless communication system, including most effective "smart antenna" spatial division multiple

There is nothing presented by Progeny (who won and paid for no LMS-M licenses)[7] for which it seeks rule changes seriously adverse to ITS (or any wide-area) use of LMS-M, that approaches the public interest in use of LMS-M for ITS wireless in the US, and thus, in maintaining the current rules.

There is nothing presented by the "Part 15 Coalition" (a non entity, with no evidence it speaks for anyone)[8] that its alleged members' unlicensed uses (by rule, secondary) and suggested needs for *even more* free spectrum--when they clearly underutilize what they have already been granted for free (as the FCC found)[9]-- trump the importance of ITS wireless and

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access and most effective coordination between mobile WWANs (using LMS-M for ITS, an other WWANs) and mobile and fixed WLANs.

[7] As detailed at length by the Telesaurus LLCs in previous written ex parte presentations in this docket dated 4.23.2007, 5.7.2007, 5.29.2007, and 6.13.2007 (dated on those dates or a day after on ECFS).

[8] As discussed by the Telesaurus LLCs in a previous written ex parte presentations in this docket dated 6.13.2007.

[9] The position of the "Coalition" is *directly at odds* (1) with the position expressed by many of its principal members from US critical infrastructure ("CI") in a Congressionally mandated study by the NTIA: special publication 01-49, "Current and Future Spectrum Use by the Energy, Water, and Railroad Industries," (2) with the NTIA conclusions in that study, and (3) with the FCC conclusions and recommendations in 2002 Staff Report on said NTIA, including: (i) said CI entities *did not* call for more unlicensed spectrum but for more (free) licensed spectrum, (ii) said entities reported that these industries find unlicensed spectrum use, including 902-928 MHz, often unreliable and not suitable for critical applications (NTIA study, pp. 3-20, 4-9, (iii) the NTIA and FCC found these industries, while seeking more exclusive (and free) spectrum, *are not using the spectrum the have efficiently*: generally, *not even with trunked systems or digital equipment*. Nor did these industries (with hundreds of billions of dollars in annual revenues) bother to buy FCC spectrum in auctions open to them, except in a scattering of cases. (As for the WISP members of the "Coalition," they too had every opportunity to buy suitable spectrum at auction, or obtain it on the secondary market.) (iv) The NTIA and FCC reports, just noted, *did not find that these industries should be granted more spectrum. Instead, the* ***FCC report*** *concluded:*

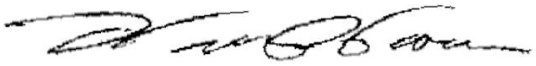
> Energy, water, and railroad interests . . . have raised concerns about their ability to access and use spectrum . . . . [They] are encouraged to continue to migrate to more efficient technologies . . . . to utilize new methods of sharing and licensing to meet their needs, to ensure that efficient and effective use of spectrum is achieved. . . . [However,] [t]he Commission . . . is especially sensitive to needs involving domestic security. [*As shown herein****, ITS wireless*** *is critical for domestic public safety*.]

At odds with all the above: the Coalition final position in this docket (by the history, a Trojan horse attempt) is an attempt to make LMS-M sub-bands useless for any practical wide-area purpose (by power and time of use decimation), so that, in effect, it turns this LMS-M licensed band into an exclusive band for its members: members that the FCC and NTIA found unworthy of more spectrum since for decades to this time do not efficiently use what they were allotted for free: spectrum worth billions of dollars if now put on the market. *If the FCC wants to consider rule changes in the public interest for these industries it could consider putting their free spectrum up for auction and let them honestly pay for it: they are huge commercial enterprises, not public agencies are charities.*

support its recent, Trojan-horse attempt in this docket to strip LMS-M of essential power and time of use.

For reasons given above, in the attached, and in the preceding presentations of Telesaurus, the Commission should reject both Progeny's and the Coalition's proposals and make no changes to the rules. It should support ITS wireless and licensees pursuing it for all the reasons it enthusiastically projected when allocating LMS-M last decade[10] that are proving entirely correct in the now rapidly unfolding ITS field, including the essential public safety purposes described herein.

Respectfully,



Warren Havens, President
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Attachments

(Use "bookmark" mode in PDF readers; some hyperlinks at bottom of pages.)

- Attachment comments, and "Costs of Mobility": crashes, deaths, congestion, pollution figures (Georgia Tech).
- DOT: ITS Public Safety Program: home page.
- DOT: ITS Public Safety Program: list member organizations.
- DOT: "The Urgent Need for Partnerships Between [ITS] Transportation and Public Safety Agencies."
- "Public Safety [Agencies] Support for Intelligent Transportation Systems" (by Harlin McEwen, IACP).
- "Transportation, Emergency Communications and Homeland Security" (by DOT, EMS Division Chief, *et al*).
- ITS Technology in Emergency Medical Services.
- DOT: List of mostly external articles regarding ITS for Public Safety.
- DOT: ITS and highway incidents, and emergency responders.
- "Integrated Incident Management System"—NYC, NY State (example).
- "Weather & Highways"—need for enhanced weather reporting for highway users (by American Meteorological Society, FHA, NSF, Ratheon, ITT Industries)

[10] The most relevant excerpts are contained in the Telesaurus 4.29.2007 written ex parte presentation.

Email copies to

Chairman Kevin J. Martin
Commissioner Michael J. Copps
Commissioner Jonathan S. Adelstein
Commissioner Deborah Taylor Tate
Commissioner Robert M. McDowell
Bruce Gottlieb, Office of Cmmr. Copps
Barry Ohlson, Office of Cmmr. Adelstein
Aaron Goldberger, Office of Cmmr. Tate
Angela Giancarlo, Office of Cmmr. McDowell
Fred Campbell, Chief, WTB
Julius Knapp, Chief, OET
Ron Chase, OET
Ira Keltz, OET
Ahmed Lahjouji , OET
Geraldine Matise, OET
Bruce Romano, OET
Alan Stillwell, OET
Karen Rackley, OET
Hugh van Tuyl, OET

Janice Obuchowski, Freedom Technologies Inc.

Mitchell Lazarus, Part 15 Coalition
Henry Goldberg, Part 15 Coaltion

Use "bookmark" mode for list of attachments in "hot" tabs.

Attachments

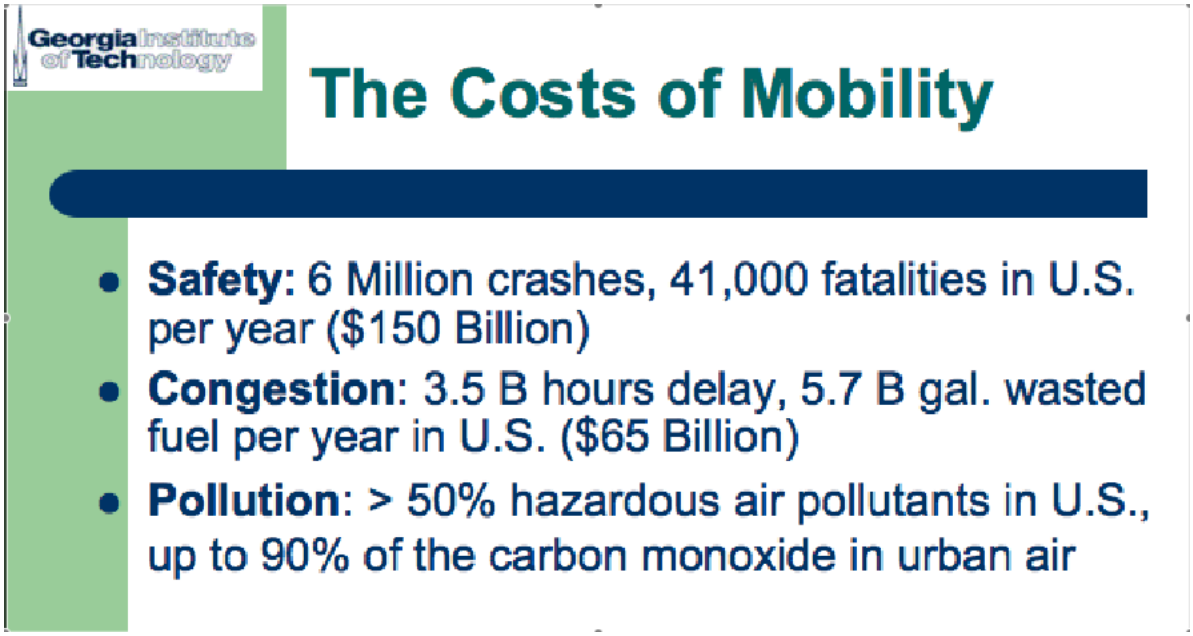
Comments on Attachments:

LMS-M based ITS location and communications systems can provide or support, and as being developed by Telesaurus will provide, all of the essential public safety applications described in all of the following attachments, as well as other public safety applications described in the above-noted 7.2.07 Presentation.

There is no debate over how essential ITS, largely and increasingly based on ITS Wireless, is to public safety functions in the US and rest of the World.

As some of the attachments discuss, there is a clear need to coordinate ITS and public safety programs including their respective wireless components.

Also, nationwide ITS Wireless in the US, as Telesaurus plans, has a good chance to be more quickly and fully implemented than integrated nationwide public safety-specific wireless (by public safety agencies) in the US due to orders of magnitude less fragmentation among the wireless licensees an other stakeholders involved, and due to more visible interaction with and direct benefits to the taxpaying public (direct daily users of highway and other transportation systems, and direct daily victims of highway pollution and burdens), and their elected officials.



[From: An Architecture Study of Ad-Hoc Vehicle Networks, 2005, Fujimoto et al, G.I.T., College of Engineering.]

What Is the ITS Public Safety Program?

Mission

The U.S. Department of Transportation (USDOT) initiated the ITS (Intelligent Transportation Systems) Public Safety Program in 2000 to increase transportation safety and mobility through new and dynamic partnerships linking the transportation and public safety communities at federal, state, and local levels.

Through the Program, USDOT is working with stakeholders in the public safety community--including law enforcement, fire and rescue, and emergency medical service (EMS) providers--to develop and demonstrate innovative procedures and technologies for more coordinated public safety and transportation operations.

Until now, ITS technologies have been developed largely without input from the public safety community. These technologies could dramatically enhance public safety if transportation and safety agencies at the federal, state, and local levels--together with industry--coordinate future product development and deployment. The mission of the ITS Public Safety program is to provide this coordination.

Program Focus Areas and Benefits

Initial program emphasis is on:

- new technologies for enhanced emergency response, and
- more coordinated traffic incident management.

These areas offer major opportunities for improving community health, safety, and security, while reducing traffic congestion and increasing the efficiency of the transportation network.

Improved communications and information-sharing--across jurisdictional, agency, and system boundaries--are key to operational success; this is the technical focus of the ITS Public Safety Program.

Stronger coordination between the transportation and public safety communities also will yield important ancillary benefits. Reduced environmental impacts from traffic incidents, enhanced disaster readiness, and more time-and cost-efficient data and communications operations for both transportation and public safety agencies are among the other improvements the Nation's communities can realize through the partnerships fostered by the ITS Public Safety Program.

Program Administration

Within DOT, the ITS Public Safety Program is coordinated among the ITS Joint Program Office, the Federal Highway Administration, the National Highway Traffic Safety Administration, and the Federal Transit Administration. Also, the program is closely coordinated with the Federal Emergency Management Agency and with the Office of Justice Programs of the U.S. Department of Justice.

Background

ITS is a term used by the surface transportation community to describe advanced communications and information systems on the highways and railways, and within vehicles. Surface transportation agencies are deploying these technologies to reduce traffic congestion, improve efficiency, and enhance travel safety. At the same time, vehicle manufacturers are introducing increasingly sophisticated in-vehicle communications and information systems that could provide real-time voice and data links to responders and show great promise for further advancing public safety.

Transportation and Public Safety Operations Are Linked

Transportation operations and public safety operations are linked inextricably. From traffic incident prevention to crash rescue, successful traffic operations depend directly on effective law enforcement, fire and rescue, and emergency medical services (EMS). At the same time, law enforcement, fire and rescue, and medical response operations require navigable roadways.

Accurate, Timely Information Is Essential

To perform best, transportation and public safety professionals need accurate and timely information. That information often must be shared across organizational and jurisdictional boundaries.

Nowhere was this need more apparent than at the Alfred P. Murrah Federal Building on April 19, 1995. When the sound of the explosion rocked downtown Oklahoma City, first responders rushed to the scene from the police department headquarters and fire and ambulance stations located within a few blocks of the blast. At the scene more than 1,500 victims were wandering in shock and panic, covered with blood and glass. Rescuers immediately started crawling through the burning rubble, searching for trapped survivors.

Then the fire department got word that the building might contain additional bombs. Everyone at the site needed to evacuate to safety at least one block clear of the building. But the fire department's radios could not reach the police, highway patrol, or ambulance crew rescuers inside the building, putting the rescuers in even greater jeopardy. Not only were operations at the scene uncoordinated; the hospitals receiving victims were not in communication with officials at the scene, and had no way of knowing how many victims to prepare for, or the nature of their injuries. Although this incident is not primarily transportation-related, it graphically illustrates the communications and coordination problems that can occur on a smaller scale at every traffic incident where multiple agencies respond.

Separate Worlds

While advanced information and communications technologies--such as wireless telephones, mobile data terminals, and automated location technologies--offer public agencies abundant opportunities for unprecedented coordination of operations and emergency response, most communities barely have begun to exploit the full potential. This is largely because the transportation and public safety sectors (and within the public safety sector, the separate law enforcement, fire and rescue, and EMS communities) generally function quite independently of one another, with separate agencies, funding streams, and professional cultures.

In many localities the transportation, law enforcement, fire and rescue, and EMS public agencies continue to develop separate information and communications infrastructures. The public safety community has had little choice in procurement, and hence uses proprietary (often custom) information systems that have proven difficult to integrate with other systems.

As disjointed systems become increasingly expensive and difficult to integrate, efforts have begun to standardize the format and content of information that is exchanged between systems. As a result, programs to develop uniform system architectures have sprung up in the USDOT, the U.S. Department of Justice, and the Federal Emergency Management Agency's U.S. Fire Administration. These efforts require coordination.

New Technologies in the Transportation Sector

The USDOT is providing national leadership in development and deployment of advanced information and communications technology in the surface transportation sector, known as Intelligent Transportation Systems (ITS). While ITS deployments have included technology to facilitate better coordination of transportation and law enforcement agency response to traffic-related incidents, the fire, rescue, and EMS functions included in ITS applications generally have been more limited in scope. A major goal of the ITS Public Safety Program is to expand ITS applications to provide broader community health, safety, security and mobility benefits.

New Technologies in the Public Safety Sector

The public safety community is moving toward more coordinated use of automated data storage and retrieval systems and of integrated mobile data and communications. Within the public safety sector, initial emphasis has been on information-sharing within the law enforcement sector or between law enforcement, fire and rescue, and EMS. Where public safety organizations coordinate with transportation agencies, the focus has been on traffic incident management. Within the fire and rescue and EMS communities, there is a growing sense of urgency regarding wireless enhanced 9-1-1 (see pp 12-13). However, funding for fire and rescue and EMS agencies is limited, and, as a consequence, these communities generally have been the slowest to implement new technologies to date.

System Integration Opportunities

Public safety and transportation officials now recognize that, despite great advances in transportation emergency services over the past decades, significant improvements in safety and mobility can be realized through more integrated public safety and transportation operations. This rapidly expanding range of possibilities for coordinating public safety and transportation systems, combined with growing public and political support, new information technology options, and new funding mechanisms, creates unprecedented opportunity. By focusing on integration of operations and equipment and considering innovative partnerships to maximize benefits from emerging next-generation technologies, transportation and public safety agencies can dramatically improve community emergency response and incident management capabilities, while saving money and improving transportation efficiency.

Broader Partnerships Are Key

The ITS Public Safety Program is focused on overcoming technical, procedural, and institutional barriers that can prevent effective

partnerships for coordinated operations among various transportation and public safety agencies and the private sector.

Intelligent Transportation Systems Joint Program Office (HOIT)
U.S. Department of Transportation, Washington, DC 20590, Toll-Free 866.367.7487

ITS Public Safety Home | Intelligent Transportation Systems Home | Federal Highway Administration Home | US Department of Transportation Home

The Urgent Need for Operational Partnerships Between Transportation and Public Safety Agencies

As transportation agencies strive to manage soaring levels of traffic congestion, public safety is at stake.

By Anne P. Canby, Senior Consultant, Cambridge Systematics

The level of traffic congestion in urban areas is soaring. Between 1990 and 1999, as vehicle travel rose 22 percent, the capacity of the U.S. highway system increased only 1 percent. The result was an average traffic delay of 36 hours per person per year, costing the nation $78 billion, including 6.8 billion gallons of wasted fuel.

Traffic congestion is not only frustrating. It can be life-threatening. One of every three times an ambulance, fire truck, or police unit is dispatched on the freeways and principal arterials of the nation's major metropolitan areas, it runs into traffic congestion.

While public safety agencies must cope with the consequences of congestion, they also play a role in causing it. Incidents on highways cause 54 percent of rush hour congestion, according to a 2001 study of 68 major metropolitan areas by the Texas Transportation Institute. When a highway incident occurs, the fire and rescue, emergency medical services (EMS), and law enforcement responders have differing missions at the site—including scene safety, care of the injured, and documentation of evidence. These missions may conflict with the transportation agency's focus on restoring traffic flow as soon as possible. For every minute a lane is closed, 4-5 minutes of traffic back-up result.

New operational partnerships between public safety and transportation agencies are urgently needed to improve the operational efficiency and effectiveness of both our transportation and our public safety systems. By sharing technology, information, and incident management protocols, transportation and public safety agencies can improve emergency response and alleviate incident-related traffic congestion.

Yet progress to date has been uneven and is not moving at a rate that will enable the transportation and public safety systems to be managed optimally anytime soon. For example:

- Speedy detection of incidents can save lives and reduce delays. Yet only 9 percent of urban freeway miles have incident detectors. Surveillance cameras are installed on only 13 percent of urban freeway miles and 1 percent of urban arterials.

- Less than 5 percent of emergency vehicles are equipped with on-vehicle route guidance systems.

- Only a handful of jurisdictions have cameras installed to enforce red-light laws, although red light running causes almost 100,000 accidents each year and 950 fatalities, and surveys show widespread consumer support for red light enforcement programs.

Technology investments are tools to reshape the approach to interagency operations. Aggressive, focused investment in core hardware and software is necessary to gather real-time data and to share it through integrated communications systems. Public safety and transportation agencies need to work together to:

- *Collect comprehensive, real-time, accurate data and provide immediate incident detection*

By deploying a network of detectors and surveillance equipment, agencies can monitor roadway and transit system operating status and detect incidents instantly.

- *Speed emergency dispatch, and improve fleet utilization*

Deploy automatic vehicle location technology in all transportation and public safety fleets. Implement computer-aided dispatch and in-vehicle route guidance capability.

- *Provide faster emergency response*

Upgrade traffic signal systems to allow immediate response to traffic flow conditions and provide green-light priority to emergency vehicles.

- *Enable data-sharing among managers and users*

Install voice and data communications capacity linking all transportation and public safety incident responders and system managers. Provide multiple outlets to distribute incident-related travel information to the public to allow them to steer around the incident.

- *Provide current and predicted weather and road condition information*

Use weather and road condition monitoring technology to improve deployment of personnel and equipment and to provide better road weather safety information to the public.

Simply investing in technology, however, won't improve the operation of the transportation and public safety systems. To fulfill the potential of the new technology, it will be necessary to create new institutional relationships; define shared management responsibility for traffic operations and incident management; and redesign incident management processes, procedures, and programs.

At the institutional level, strong leadership is necessary to make integration of transportation and public safety operations a priority. Agencies must work together to develop a common vision and agenda, based on mutual appreciation of the differing missions and cultures of the transportation, law enforcement, fire and rescue, and EMS communities. To achieve these goals, agencies must updgrade skills, identify new funding sources and use existing fund allocations more flexibly, revise policy, and increase management flexibility.

Transportation and public safety can be transformed by teaming **strategies** such as forming incident management teams and developing integrated interagency incident management protocols, with **technical improvements** such as operation of integrated operations management centers and development of real-time, mobile, interoperable voice and data communications systems.

Congestion is an issue that cannot be ignored. Fully integrating the management of the transportation and public safety systems is a challenge that will require a change in mindset. It is a challenge that must be met to serve the citizens who depend on efficient transportation and public safety service.

Intelligent Transportation Systems Joint Program Office (HOIT)
U.S. Department of Transportation, Washington, DC 20590, Toll-Free 866.367.7487

SUBJECT to DEBATE

A NEWSLETTER OF THE POLICE EXECUTIVE RESEARCH FORUM

Vol. 16, No. 6 June 2002

FOCUS ON IMMIGRATION POLICY

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See **Transportation** *on Page 5*

Balancing Act: Security vs. Liberty

Editor's Note: This article continues the debate from the PERF Annual Meeting on local police–INS issues. We invite all subscribers to respond to this article with a Letter to the Editor (submissions should be sent to dedelson@policeforum.org.)

by Bernard Melekian

In the post-September 11 world, our greatest challenge is not dealing with terrorists. Rather it is finding the balance between enhancing security and maintaining liberty. The definition of that balance will not be found in our old ways of thinking.

The recent proposal to enlist state and local police to enforce federal immigration laws has generated a great deal of controversy. The arguments on both sides of this issue have merit and articulate real needs among the concerned stakeholders.

On one side, without additional resources, the federal government will never be able to effectively control our nation's borders. On the other side, local police have worked for a number of years to build relationships with immigrant communities. Enforcement of immigration laws could destroy that relationship and in so doing would jeopardize, not enhance, national security.

The problem with both arguments is that they are advanced under the umbrella of the status quo. What we need to do is completely revamp our immigration system to reflect reality. Simply put, in order to strengthen the security of our borders, we need to open them.

Currently the vast majority of illegal immigration, particularly in California, is driven by economic necessity. People are not going to suffer on one side of an artificial line when they can provide for their families by crossing to the other side. Because border crossings are illegal, the "coyote" has developed as an integral part of the immigrant journey. This opens the entire border with Mexico as a potential point of crossing. Unless we are prepared to bear the expense of sealing the border and patrolling it, we will never be able to apply adequate resources to address the problem.

Terrorists who want to enter this country undetected benefit from this reality. First, the avenues available for crossing illegally into the United States are virtually unlimited. They simply join with throngs of other illegal immigrants and cross over.

Secondly, once here in this country, they can quickly lose themselves in the

See **Balancing Act** *on Page 4*

IN THIS ISSUE

Transportation *from Page 1*

gency medical services (EMS), and law enforcement responders have differing missions at the site—including scene safety, care of the injured, and documentation of evidence. These missions may conflict with the transportation agency's focus on restoring traffic flow as soon as possible. For every minute a lane is closed, 4-5 minutes of traffic back-up result.

New operational partnerships between public safety and transportation agencies are urgently needed to improve the operational efficiency and effectiveness of both our transportation and public safety systems. By sharing technology, information, and incident management protocols, transportation and public safety agencies can improve emergency response and alleviate incident-related traffic congestion.

Yet progress to date has been uneven and is not moving at a rate that will enable the transportation and public safety systems to be managed optimally anytime soon. For example,

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Technology investments are tools to reshape the approach to interagency operations. Aggressive, focused investment in core hardware and software is necessary to gather real-time data and to share it through integrated communications systems. Public safety and transportation agencies need to work together to

- collect comprehensive, real-time, accurate data and provide immediate incident detection. By deploying a network of detectors and surveillance equipment, agencies can monitor roadway and transit system operating status and detect incidents instantly;

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- deploy automatic vehicle location technology in all transportation and public safety fleets. Implement computer-aided dispatch and in-vehicle route guidance capability;

- provide faster emergency response;

- upgrade traffic signal systems to allow immediate response to traffic flow conditions and provide green-light priority to emergency vehicles;

- enable data-sharing among managers and users;

- install voice and data communications capacity linking all transportation and public safety incident responders and system managers;

- provide multiple outlets to distribute incident-related travel information to the public to allow them to steer around the incident;

- provide current and predicted weather and road condition information; and

- use weather and road condition monitoring technology to improve deployment of personnel and equipment and to provide better road weather safety information to the public.

Simply investing in technology, however, won't improve the operation of the transportation and public safety systems. To fulfill the potential of the new technology, it will be necessary to create new institutional relationships; define shared management responsibility for traffic operations and incident management; and redesign incident management processes, procedures, and programs.

At the institutional level, strong leadership is necessary to make integration of transportation and public safety operations a priority. Agencies must work together to develop a common vision and agenda, based on mutual appreciation of the differing missions and cultures of the transportation, law enforcement, fire and rescue, and EMS communities. Upgrading skill; identifying new funding sources; employing more flexibility in using existing fund allocations; policy revisions; and management flexibility are required.

Strategies such as forming incident management teams and developing integrated interagency incident management protocols, together with forming collaborative management centers and developing real-time, mobile, interoperable voice and data communications systems can transform transportation and public safety operations.

Congestion is an issue that cannot be ignored. Fully integrating the management of the transportation and public safety systems is a challenge that will require a change in mindset. It is a challenge that must be met to serve the citizens who depend on efficient transportation and public safety service.

Anne P. Canby is a Senior Consultant at Cambridge Systematics, Inc. in Cambridge Maryland.

Coming Next Issue: Problem Solving Quarterly

Problem Solving Quarterly is PERF's newsletter dedicated to highlighting innovative problem-oriented policing strategies that utilize the SARA Model to address crime and disorder.

For information on submitting a project for a future issue please contact David Edelson at dedelson@policeforum.org.

PSAG Membership Roster

Steve Browne, Chair
Denver Department of Safety

Emergency Communicators

Paul Einreinhofer
Association of Public-Safety Communications Officials International (APCO)

Jim Goerke
National Emergency Number Association (NENA)

Emergency Medical Services

Dia Gainor
National Association of State EMS Directors (NASEMSD)

Emergency Physicians

Jack Allison
American College of Emergency Physicians (ACEP)

Ricardo Martinez
Safety Intelligence Systems

Fire and Rescue Community

Mike Brown
International Association of Fire Chiefs (IAFC)

T.J. Nedrow
National Volunteer Fire Council (NVFC)

Local Law Enforcement Agencies

Harlin McEwen
International Association of Chiefs of Police (IACP)

Local Public Safety Community

Steve Browne, Chair
Denver Department of Safety

Bill Hinkle
Office of Emergency Communications
Hamilton, OH

Local Transportation Agencies

NEW
Now you can gain a quick overview of the DOT's ITS Public Safety Program's many projects through standard slide shows. Each slide show module includes full explanatory text. ***More...***

NEW
Project Briefs that describe the R&D projects and other activities supported by the ITS Public Safety Program are now available on line. ***More...***

NEW
ITS and Computer-Aided Dispatch System Integration Field Operational Tests
Major metropolitan areas in the United States have advanced traffic management systems (ATMS) at the core of their Intelligent Transportation Systems (ITS) deployments. But ITS systems are not integrated with public safety computer-aided dispatch (CAD) systems. Most existing CAD systems are proprietary and are not designed to exchange information with CAD systems offered by other vendors, let alone with ATMS. Additional challenges are posed by variations in formats and protocols for data and for messaging, and different system standards in the transportation and public safety communities. The U.S. Department of Transportation (DOT) has recently launched two projects to demonstrate that the technical and institutional barriers to public safety and transportation system integration can be overcome. ***More...***

NEW
DOT Wireless E9-1-1 Steering Council
Releases Priority Action Plan
May 2003—The U.S. Department of Transportation's (DOT's) Wireless E9-1-1 Steering Council has forwarded a **Priority Action Plan** to Secretary of Transportation Norman Y. Mineta. Secretary Mineta convened the Wireless E9-1-1 Steering Council in April 2002 to develop an action plan to accelerate compliance with the Federal Communications Commission's (FCC's) wireless E9-1-1 mandates. ***More...***

Barbara Hauser
Maricopa County (Arizona) Department of Transportation

State Law Enforcement Agencies

Clarence Bell
Maryland State Police

Mel Carraway
Indiana State Police

State Transportation Agencies

James Wright
American Association of State Highway and Transportation Officials

Telematics Industry

Bill Ball
OnStar

Towing & Recovery Industry

Harriet Cooley
Towing & Recovery Association of America

When someone makes a call to 9-1-1, they expect to get help right away. We cannot, and will not, accept a system where these callers cannot be located..." **Norman Y. Mineta, Secretary of Transportation.**
Full Text of Mineta Speech

New York State Wireless Enhanced 9-1-1 Implementation Guide
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New York State Wireless Enhanced 9-1-1 Lessons Learned
HTML, PDF
1.45MB

Intelligent Transportation Systems Joint Program Office (HOIT)
U.S. Department of Transportation, Washington, DC 20590, Toll-Free 866.367.7487

Public Safety and Transportation Agencies Need to Evolve Toward Regional, Integrated Operations

Regional partnerships will require new institutions, and profound organizational changes that may take a long time. Leaders need to step forward.

By Joseph M. Sussman, Professor of Civil and Environmental Engineering and Engineering Systems, MIT

Public safety and transportation agencies coordinate their operations often--to respond to highway crashes; to manage crowds and traffic for special events; and, when disaster strikes, to ensure public safety and security.

To harvest the great potential of these new information-sharing technologies . . . public safety and transportation agencies must work together in new ways. Regional-scale cross-agency and cross-jurisdictional cooperation, along with jointly developed programs, plans, and procedures, will be required. Major changes in the way agencies are organized, and they way they operate, will be necessary.

A lot depends on the efficiency of these joint operations--how fast the injured receive emergency medical care; how quickly drivers stuck in traffic backups can move on with their businesses and their lives; and how effectively communities prevent widescale injury, death, and destruction during natural and man-made disasters.

Driven in part by new political and economic constraints on building, transportation agencies are trying to maximize the efficiency of transportation system operations in order to manage growing urban traffic congestion. They are investing in new information and communication technologies--centralized operations centers; traffic and road condition monitoring systems; automatic vehicle location and geographic information systems for fleet management; and mobile information and communications systems for vehicle dispatch. Public safety agencies (law enforcement, fire and rescue, emergency medical services) also are upgrading information and communication systems.

To harvest the great potential of these new information-sharing technologies and improve the efficiency of transportation and emergency services, public safety and transportation agencies must work together in new ways. Regional-scale cross-agency and cross-jurisdictional cooperation, along with jointly developed programs, plans, and procedures, are required.

Regional-scale integration will be difficult to achieve. Major changes in the way agencies are organized and the way they operate will be necessary. Organizations that have previously have operated independently will have to function as part of an integrated team. They will have to sacrifice some autonomy, share information and responsibility, and, perhaps most difficult of all, learn to pool funding resources.

Metropolitan planning organizations (MPOs) are a logical organizational platform for regional-scale operations, but MPOs also will have to undergo major institutional change if they are to assume the regional operations coordination role. While transportation planning is long-term and abstract, operations are every day. They happen in real time.

Successful operations require planning. Knowing the chains of command and having contingency plans for "standard" situations is fundamental to transportation operations. If performance is to be achieved, effective operations planning is a requirement.

While the technology to allow real-time operations coordination exists, and more and more of it is in place, a change in professional training and organizational and institutional perspective is necessary for the real-time vision to be achieved. Decisive action and discipline are needed. The response to changing conditions must be very fast if congestion, safety and security hazards are to be ameliorated or avoided.

To summarize, transportation and public safety agencies need to change at three levels:

- *At the individual level*, where new professional skills and professional values are required;

- *Within the agencies*, where organizational change is needed to place greater emphasis on efficient joint operations;

- *Among agencies*, where mission coordination and new regional, integrated operational structures are necessary.

Strong leaders with vision need to step forward. There is much to be done. Organizational restructuring, training, regional institutional development, new funding arrangements--all require sustained leadership and effort, based on a fundamental rethinking of our transportation and public safety organizations for the future--at all levels of government and the private sector.

Intelligent Transportation Systems Joint Program Office (HOIT)
U.S. Department of Transportation, Washington, DC 20590, Toll-Free 866.367.7487

The Police Chief, February 2003

TECHNOLOGY TALK

Public Safety Support for Intelligent Transportation Systems

By Harlin R. McEwen, Chief of Police (Retired), Ithaca, New York, and Chairman, IACP Communications and Technology Committee, and K. Craig Allred, Public Safety Coordinator, Intelligent Traffic Systems Joint Program Office, Federal Highway Administration, U.S. Department of Transportation, Washington, D.C

Crashes kill more than 41,000 Americans every year–roughly 115 a day, or one every 13 minutes. In these and other emergencies, lives depend on how fast rescuers reach the scene. The good news is that emerging technologies in transportation and communication can both save lives on the highways every day and form the technology foundation for a stronger disaster preparedness network that bolsters homeland security.

Intelligent transportation systems, or ITS, can be a vital link for the entire community of emergency responders: law enforcement, fire and rescue, emergency management, and emergency medical services (EMS). Interoperability is the key–real-time, mobile, cross-agency voice and data networks that allow responders from different services to locate incidents, to navigate traffic congestion, and to work together more effectively.

Some ITS systems are familiar to the law enforcement community-road condition sensors and cameras, automated traffic signals, changeable message signs. In the past decade, many major metropolitan areas have deployed ITS systems coordinated from transportation management centers that sometimes are co-located with state police or other highway patrol operations centers or with city police operations centers. ITS system deployments currently focus on real-time traffic management. But expanded ITS deployments–to bring real-time incident information to all emergency responders, simultaneously, with interoperable mobile voice and data networks–can vastly increase the benefits of ITS beyond traffic management into public safety and security.

The latest call for interoperable networking of public safety and ITS communications technologies comes from the Public Safety Advisory Group (PSAG) at the Intelligent Transportation Society of America (ITS America). The IACP is a member of the PSAG, which last year produced Recommendations for ITS Technology in Emergency Medical Services, a report written by leading emergency physicians and experts on EMS and 911 services. The report calls for rapid implementation of the following lifesaving technologies:

* Wireless E-911. Wireless telephone use is growing rapidly, but most 911 operators can determine neither the location nor telephone number of an incoming wireless call. A U.S. Department of Transportation-funded survey of the nation's 3,136 jurisdictions (counties, parishes, independent cities, boroughs, and census areas) showed that only 33 of them had wireless call location capability in December 2002. The report calls for rapid implementation of wireless location technology, known as wireless enhanced 911, or wireless E-911.

* Automatic collision notification (ACN) systems. Such systems would contact emergency call centers immediately upon vehicle impact and provide instant location information. Next-generation ACN systems will be able to transmit data on crash severity and likely passenger injuries. Emergency medical responders would be able to use to data to determine the type of EMS unit to send, the mode of transport (air or ground), where to transport the injured, what kind of treatment may be needed, and what medical teams and other hospital resources to prepare.

* Signal priority and real-time in-vehicle route guidance systems. These systems would help move emergency vehicles more efficiently through ever more congested roadways. Transponders on patrol cars, fire and rescue vehicles, and ambulances would provide green-light priority to emergency vehicles. In-vehicle route guidance would map the quickest route to and from the incident, taking current traffic conditions into account.

* Real-time mobile cross-agency voice and data networks. The networks would include hospitals and trauma centers as well as law enforcement, transportation, fire and rescue, emergency communicators, emergency management agencies, hazmat units, and other emergency response agencies. Everyone would get the same incident information at the same time (with appropriate data firewalls to ensure the security of confidential information).

Some of the ITS technologies endorsed in the new report are available now; others are being field-tested or will be coming soon. The report calls on federal, state, and local government and the transportation industry to implement them. This is a push that needs a lot of money and a lot of support-including support from the law enforcement community.

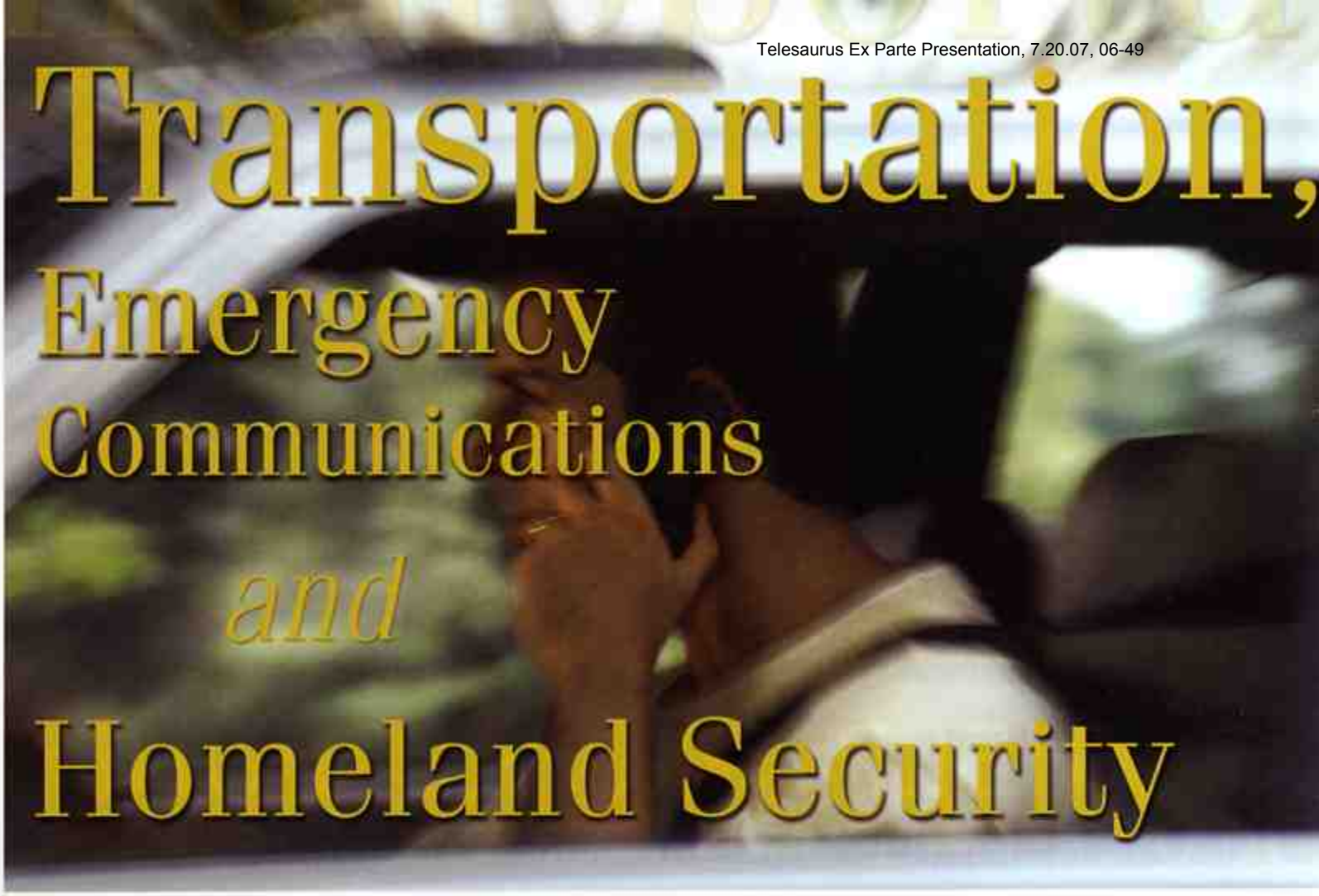
State-of-the-art interoperable communications technology is a basic need. With it, we can meet the challenge of reducing the highway death toll while improving homeland security and emergency preparedness. Without it, we can't.

The full text of Recommendations is available at www.itspublicsafety.net/index.htm, the Transportation Department's ITS Public Safety Web page.

IACP Technology Meetings
May 14-20, 2003
Greensboro, North Carolina

*** Communications and Technology Committee**
*** Criminal Justice Information Systems Committee**
*** Technology Coordination Panel**
*** Law Enforcement Information Management Section Conference and Exhibition**

Agenda available online at www.iacptechnology.org.



Transportation, Emergency Communications and Homeland Security

By K. Craig Allred, Coordinator, ITS Public Safety Program, ITS Joint Program Office, U.S. Department of Transportation and Jeff Michael, Chief, EMS Division, National Highway Transportation Safety Administration, U.S. Department of Transportation

The traditional link among transportation, 9-1-1, and emergency services is the traffic crash. This link is as strong as ever. Traffic crashes are still the single leading cause of death for young Americans. And 9-1-1 is still the essential first link in the chain of survival.

However, there's now another link that's just as urgent: national security and our war against terrorism. Never before has there been such a need for quick and positive emergency access. President Bush is calling for neighborhood watch programs. And these programs can only be effective if there is a reliable emergency access system in place.

Emergency communications is at a crossroads. Our 9-1-1 system is facing the greatest challenge it has ever confronted—moving from one technology infrastructure to another: wireline to wireless. And our nation is facing a security imperative—that of building a national communications system that can protect against future acts of terrorism. The challenge is formidable, but our 9-1-1 system has never had a better opportunity to serve the nation.

For the past 30 years, emergency medical services have relied on the U.S. Department of Transportation (USDOT) for national leadership. Through the National Highway Transportation Safety Administration (NHTSA), USDOT leads development of national consensus standards (the National Standard Curricula) for emergency medial technicians, for emergency vehicle operators, for medical directors, and even for emergency medical dispatchers.

USDOT also has a long history in 9-1-1. We were right there with you in the late 1960s when the first 9-1-1 call was made. In 1969, we included a recommendation for a universal emergency number in our State Highway Safety funding policies. In 1973, we got a little more specific, requiring that the universal emergency number should be 9-1-1. And by 1978, we were providing model legislation to help states build their 9-1-1systems.

In recent years, NHTSA and the USDOT's Intelligent Transportation Systems (ITS) Public Safety Program have worked with the National Emergency Number Association (NENA) and other partners in the public safety community to support implementation of wireless E9-1-1. Secretary of Transportation Norman Mineta recognizes the lifesaving benefit that wireless E9-1-1 can offer to crash victims, especially those in a rural single vehicle crash that might otherwise be undiscovered for critical minutes or hours. The Secretary also recognizes the importance of wireless E9-1-1 implementation for national security. In early April 2002, the Secretary met with a group of 9-1-1 stakeholders and announced his Secretary's Initiative for Wireless E9-1-1. The Secretary's initiative also includes a large technical assistance effort being led by NENA and the Association of Public-Safety Communications Officials, International (APCO). The DOT is providing funding for NENA and APCO to develop a range of tools and services, including educational packages to keep 9-1-1 centers apprised of national trends.

NENA has been central in the planning of the Secretary's Initiative and will need to be central in its implementation as well. Specifically, the Action Plan calls for NENA to take the lead on:

- monitoring deployment of wireless E9-1-1 across the nation;
- developing model plans for local implementation;
- educating 9-1-1 centers about wireless E9-1-1 implementation needs and strategies;
- assisting with the creation of local cost-recovery agreements by conducti ng national cost analyses, creating guidelines, and sharing success stories.

The Secretary has asked NENA to help with an advanced technology roundtable that USDOT will host in the fall of 2002. We want to build on the NENA Future Path Plan to ensure that we are looking far enough ahead and considering all the technological options as we design the next generation 9-1-1 system. This roundtable will bring together a group of 9-1-1 technical experts with a similar group from other high-tech fields, such as Silicon Valley firms, to look at opportunities for making evolutionary changes that could make 9-1-1 even more effective or more affordable.

We also see the potential of the wireless E9-1-1 infrastructure for carrying advanced crash notification data. Systems like GM OnStar® can be enhanced in the future so, in addition to crash notification, they can carry information about the medical condition of the victim. This will allow emergency physicians to prepare for the arrival of victims needing specialized care.

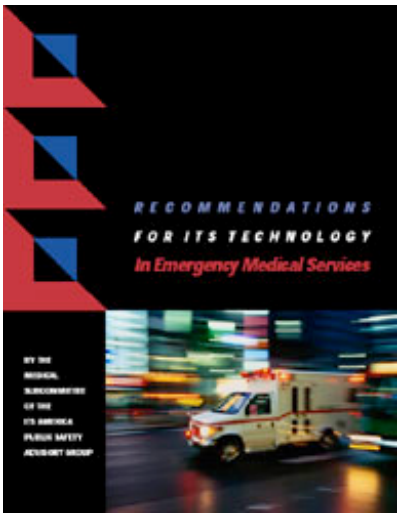
These technologies can improve emergency response by providing incident location, passenger medical histories, and crash impact information not otherwise available. However, the same technologies might create a burden for 9-1-1 calltakers and dispatchers if they require the calltakers and dispatchers to handle more information than needed. Worse, they could delay emergency response if their input to the 9-1-1 center is delivered through a non-priority line.

The dispatch and EMS communities must be involved long *before* technology is introduced to the marketplace, in order to assure its seamless integration into the existing 9-1-1 and emergency response system. A new report to be released this fall, entitled *An EMS Perspective on Future Development of ITS Technologies*, written by the medical subcommittee of ITS America's Public Safety Advisory Group (PSAG), will be a first step toward earlier involvement of the emergency response community in ITS technology development.

The emergency response community is already engaged in early planning of DOT and ITS activities. ITS America's PSAG provides a unique forum for discussion of issues of cross-cutting concern to the transportation and public safety communities and for input into DOT and ITS programs. It includes representatives of the transportation, EMS, emergency communications, law enforcement, fire and rescue, and towing and recovery communities. NENA representatives are active in the PSAG and have been instrumental in key PSAG activities, such as the development of the medical subcommittee's report.

We at USDOT urge NENA members to make rapid implementation of wireless E9-1-1 a high priority in the coming year, so that we can get this important job accomplished and move on to other issues, including the application of new ITS technologies to emergency medicine. We are proud of our long history of partnership with the 9-1-1 and emergency response communities and are actively working to strengthen this partnership in coming years, in order to build the emergency communications network that America deserves.

For more information, see www.its.dot.gov. Click on "Public Safety." **NN**



Recommendations for ITS Technology in Emergency Medical Services

View or download full report. (PDF, HTML)

View or download four-page report summary. (PDF, Word)

Recommendations for ITS Technology in Emergency Medical Services

Emergency physicians and other emergency responders call for rapid implementation of new life-saving Intelligent Transportation System (ITS) technologies in a report developed with funding support from the U.S. Department of Transportation's (DOT's) ITS Public Safety Program. The authors assert that these new technologies can save lives on the nation's highways, as well as in terrorist attacks and natural disasters, if brought to market promptly.

The report cautions that life-saving technologies such as telematics and telemedicine must be designed to integrate seamlessly with ongoing EMS operations. Emergency responses can be delayed if dispatchers are overloaded with too much information or if the information is not relayed on 9-1-1 or other priority communication lines, the report says.

Those working in emergency medical services "must be involved long before technology is introduced," said Dr. Jackson Allison, chairman of the medical subcommittee of the Intelligent Transportation Society of America's (ITS America's) Public Safety Advisory Group (PSAG), which wrote the report.

Technologies discussed in the report include:

- Wireless location technology (wireless enhanced 9-1-1 or wireless E9-1-1);
- real-time, mobile, cross-agency voice and data networks that allow reponders from different agencies and units to talk to one another more effectively;
- traffic signal priority and route guidance systems that help move emergency vehicles through ever-more-congested roadways;
- automatic collision notification systems that contact emergency centers immediately upon a vehicle's impact, providing instant location information, and soon also may provide data related to crash severity and likely passenger injuries to both emergency responders and hospitals or trauma centers.

Summary of Recommendations

The *Recommendations* address priority action items for improvement of each link in the "chain of survival" sequence – the sequence of events that must occur to ensure the best possible outcome for victims of traumatic injury, cardiac arrest, and other time-critical, life-threatening situations. Highlights of the recommendations follow:

9-1-1

- Implement wireless location technology so 9-1-1 can locate callers using cell phones.
- Make wireless telephone service available everywhere.

Prompt EMS Dispatch and Arrival on Scene

- Provide resources to EMS community for new information and communication equipment, including automated location, real-time route guidance, and interoperable, real-time, voice and data networks.

First Aid Before EMS Arrives

- Assure that the first operator answering an emergency call is trained in Emergency Medical Dispatch (EMD) procedures.

Medical Care On Scene and In Transit to Hospital

- Develop technical standards and procedures, and legal and ethical guidelines for telemedicine and advanced Automatic Crash Notification (advanced CAN) systems as soon as possible, to promote rapid implementation of these life-saving technologies.

Trauma Center and Hospital Care

- Encourage trauma centers and hospitals to participate in regional emergency response partnerships to focus on implementation of cross-agency interoperable data-exchange and communications networks.

Public Health, Safety and Security

- Integrate ITS technology into existing Emergency Management Systems and form ongoing operational partnerships and real-time communications networks connecting all emergency responders – including, at minimum, EMS providers, transportation agencies, law enforcement agencies, and emergency management agencies.

PROBLEM	SOLUTION
Crash victims die due to delay in 9-1-1 calls. Single-vehicle rural crashes account for about one-third of all fatal crashes. In many of these (and other) fatal accidents, the fatality occurs because of delay between the time the crash occurs and the time 9-1-1 is called.	**Automatic Collision Notification (ACN) systems** automatically notify an Emergency Call Response Center when a crash occurs.
Rescuers can't locate victims who call 9-1-1 on cell phones. 9-1-1 calltakers automatically receive location information on calls placed from landline phones, but not from cell phones. Wireless 9-1-1 location technology is available in only a few areas.	**Wireless carriers should move quickly to provide 9-1-1 location technology** as required under Federal Communications Commission rules adopted in 1996. By 2005, carriers are required to provide location information for all wireless 9-1-1 calls, but progress toward that goal is slow.
Emergency vehicles are stuck in traffic. When emergency medical vehicles are stuck in traffic, medical treament is delayed and as a result victims may suffer more severe injuries, or die.	**Fleet location, signal priority, and real-time route guidance systems** enable emergency vehicles to move through traffic and arrive on scene as quickly as possible. Patient outcomes are improved.
Crash victims die due to delay in 9-1-1 calls. Single-vehicle rural crashes account for about one-third of all fatal crashes. In many of these (and other) fatal accidents, the fatality occurs because of delay between the time the crash occurs and the time 9-1-1 is called.	**Automatic Collision Notification (ACN) systems** automatically notify an Emergency Call Response Center when a crash occurs.
Victims of mass casualty events are routed to overcrowded or understaffed emergency	**Real-time, mobile, cross-agency voice and data communications networks** enable hospitals to

medical facilities where they wait for treatment, while other nearby facilities in the region have epty beds or superior patient care facilites. In incidents involving many patients requiring emergency medical services, the lack of real-time information and communication networks for coordination of patient transport can cost lives. direct the flow of patients so that regional emergency medical resources can be used more efficiently.

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ITS Public Safety Program

Public Roads

Magazine of the Federal Highway Administration

"CAD and ITS Working in Concert," by K. Craig Allred, ITS Public Safety Program Coordinator, November/December 2003.

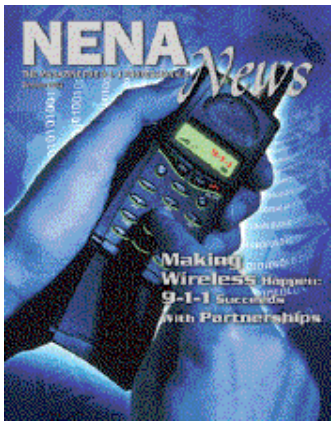
Field tests are integrating advanced traffic management systems with computer-aided dispatch systems to provide real-time information that can improve public safety. More

Subject to Debate

Newsletter of the Police Executive Research Forum

"The Urgent Need for Operational Partnerships Between Transportation and Public Safety Agencies," by Anne P. Canby, Senior Consultant, Cambridge Systematics, June 2002.

As transportation agencies strive to manage soaring levels of traffic congestion, public safety is at stake. PDF, HTML



NENA News

Magazine of the National Emergency Number Association

"Transportation, Emergency Communications, and Homeland Security," by K. Craig Allred, ITS Public Safety Program Coordinator, Autumn 2002.

The traditional link among transportation, 9-1-1, and emergency services is the traffic crash. This link is as strong as ever. Traffic crashes are still the single leading cause of death for young Americans. And 9-1-1 is still the essential first link in the chain of survival. However, there's now another link that's just as urgent- national security and our war against terrorism. PDF, Word

"Emergency Communicators Join Emergency Physicians and Others to Endorse Life-Saving Technologies," by E. Jackson Allison, Jr., MD, Associate Dean and Professor, S.U.N.Y. Upstate Medical Center and Physician Executive, Syracuse Veteran's Affairs Medical Center; and William Hinkle, Director of Communication, Hamilton County, Ohio, December/January 2002-2003.

"Telematics," "telemedicine," "E9-1-1"-these new technologies could save thousands of lives on the nation's highways, as well as in terrorist attacks and natural disasters, if implemented rapidly and applied properly. PDF

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Now you can gain a quick overview of the DOT's ITS Public Safety Program's many projects through standard slide shows. Each slide show module includes full explanatory text. ***More...***

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The Police Chief

Magazine of the International Association of Chiefs of Police

"Public Safety Support for Intelligent Transportation Systems," by Harlin R. McEwen, Chief of Police (retired), Ithaca, New York; Chairman, International Association of Chiefs of Police Communications and Technology Committee, February 2003.

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American Towman

"Intelligent Clearance Practices," by William Parks, owner of Transport Towing, Inc. Joliet and Morris, Illinois. July 2001.

First as an industry we have to look at and understand what Traffic Incident Management is, how Traffic Incident Management has an will impact our industry, what we as an industry can do to be compliant, and why the Federal Highway Administration is showing a growing concern to expand Incident Management concepts. PDF

Towing and Recovery Footnotes

"Trooper Tom, The Tower's Friend: An advocate for treating towers as full partners in incident management," By Doug Pilley, December 2003.

". . . the tower is the last one called, is often told what equipment to bring, and then is criticized for the work he's done and for overcharging." Word

Papers

"Commercial Mobile Radio Services for Public Sector Agencies," by Carl Kain, Mitretek Systems, Inc., prepared for the USDOT ITS Joint Program Office, October 2003.

There are many actions taken recently by the Federal Communications Commission (FCC) that have a major impact on the use of both commercial services and land mobile radio by public sector agencies. As a result, many of these agencies may have to perform costly upgrades or replacements of their land mobile radio systems, or systems that use commercial technologies such as CDPD. This paper describes the FCC actions, the wireless communications systems that are affected, and examines the potential role of emerging 2.5 and 3G commercial mobile radio systems for public sector agency use. PDF

"Advanced Transportation Technology: How It Helps Police, Fire, and EMS Operations," by Rick Schuman, Traveler Information Systems, PBS&J and Michael D. Meyer, Professor, Civil and Environmental Engineering, Georgia Institute of Technology, 2001.

Advanced transportation technology can elevate public safety and security service to new levels of excellence. The data these technologies produce also encourages increased accountability for incident management and emergency response. More

"Public Safety and Transportation Agencies Need to Evolve Toward Regional, Integrated

When someone makes a call to 9-1-1, they expect to get help right away. We cannot, and will not, accept a system where these callers cannot be located..." **Norman Y. Mineta, Secretary of Transportation.**
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Operations," by Joseph M. Sussman, Professor of Civil and Environmental Engineering and Engineering Systems, Massachusetts Institute of Technology, 2001.

Regional partnerships will require new institutions, and profound organizational changes that may take a long time. Leaders need to step forward. More

"Regional Operating Organizations," by D. Craig Roberts, Manager, ITS Policy, PBS&J, 2001.

New regional organizations or partnerships are needed to coordinate transportation, law enforcement, fire and rescue, and EMS operations. More

"A Systems Management Approach to Transportation Operations Management," by Stephen Lockwood, Vice President, Parsons Brinckerhoff, 2001.

Coordinated planning, day-to-day cooperation,information-sharing, and common performance measurement are in the future for transportation and public safety agencies. More

"What is the Role of Public Safety Agencies in Highway Operations?" by Kevin Dopart, Manager, Vehicle Systems and Public Safety, Mitretek Systems, Inc., 2001.

Keeping traffic moving efficiently is not part of the core mission of public safety agencies. The transportation community wants that to change. But political and policy considerations will continue to shape the scope, emphasis and degree of public safety involvement in highway operations. More

Intelligent Transportation Systems Joint Program Office (HOIT)
U.S. Department of Transportation, Washington, DC 20590, Toll-Free 866.367.7487

ITS Public Safety Program

- ITS Public Safety Program Fire and Rescue Activities
- Federal Interagency Coordination
- Emergency Vehicle Safety Initiative
- Links
- Project Brief on Model Procedures Guide for Highway Incidents (PDF, Word)
- Slide Show and Text on Model Procedures Guide for Highway Incidents (PPT, HTML)

The U.S. DOT's ITS Public Safety Program includes a number of activities that support firefighter response to highway incidents.

Out for Comment--
Model Procedures Guide for Highway Incident Management

March 2003—In a project funded through the ITS Public Safety Program, the National Fire Service Incident Management System Consortium has drafted "Model Procedures Guide for Highway Incidents," currently out for public comment.

The new Model Procedures Guide proposes using the Incident Management System to enable all responders to organize their collective efforts for use of their marshalled resources.

Many agencies respond to highway incidents—law enforcement, fire and rescue services, emergency medical services, transportation, public works, utilities, towing services, and others. Coordination among these agencies is crucial; a single, unified effort is safer and more effective than adjacent but separate activities. ***More...***

Highway Safety Training Video for Emergency Responders

A firefighter carrying a hose line across a roadway toward a fire is hit by a motorist. A paramedic tending to an accident victim is hit by a car trying to maneuver around the accident scene. A police officer helping a stranded motorist is struck by a passing vehicle. These secondary crashes involving emergency responders are all-too-common occurrences on our nation's highways.

In a program funded by the U.S Fire Administration (USFA), and supported by the U.S. Department of Transportation's (DOT's) ITS Public Safety Program, the Emergency Responder Safety Institute is tackling the problem on several fronts, from developing best practices and safety training programs, to raising public awareness. The institute is a volunteer committee of the Cumberland Valley Volunteer Fireman's Association (CVVFA), a regional organization in Maryland, Delaware, Pennsylvania, and New Jersey, which brought the problem into the national spotlight with a 1999 White Paper "Protecting Emergency Responders on the Highways."

With funding support from DOT's ITS Public Safety Program (by way of the Federal Emergency Management Agency (FEMA) and the USFA), the institute produced a videotape in 2002 to raise awareness of highway safety within the responder community. ***More..***

- ITS and Incident Management - New York City IIMS
- ITS and Incident Notification
- CAD-ITS Integration Field Test
- Law Enforcement Links
- Project Brief on CAD/ITS Integration Field Test (PDF, Word)
- Slide Show and Text on CAD/ITS Integration Field Test (PPT, HTML)
- Project Brief on NY City's Integrated Incident Management System (IIMS) (PDF, Word)
- Slide Show and Text NY City's Integrated Incident Management System (IIMS) (PPT, Word)
- Austin TX slide show on Combined Transportation, Emergency, Combined Transportation, Emergency, & Communication Center (CTECC) & Communication Center (CTECC) (PDF, HTML)
- Portland Dispatch Center Consortium CAD Integration Projects slide show (PDF, HTML)

Integrated Communications System Speeds Traffic Recovery After Crashes on New York City Streets

Overview | Benefits | Parternships | Technology | Contact

At a time when homeland security concerns demand interagency solutions, the Integrated Incident Management System (IIMS) provides critical emergency management links between New York City and New York State transportation agencies and public safety agencies.

Driving in New York City is slow enough when traffic is flowing smoothly. Add a crash or other roadway incident to the mix, and highway back-ups often last for hours. The good news is that on selected highway patrol routes in all five boroughs (see Figure 1), traffic recovery times are being reduced significantly thanks to a state-of-the-art, multi-agency mobile integrated communications network.

Figure 1. The Five Borough IIMS Test Deployment Area. The red and blue lines indicate selected highway patrol routes.
(Red = Phase I; Blue = Phase II)

With support from the U.S. Department of Transportation (DOT's) ITS Public Safety Program, the Integrated Incident Management System (IIMS) is being tested by the New York State Department of Transportation (NYSDOT), the New York City Police Department (NYPD), the New York City Department of Transportation (NYCDOT), and several other city agencies. The IIMS system began operating in 2001. City and state officials use it to manage several roadway incidents each day.

Technology Reduces Roadway Clearance Time

With IIMS, response and clearance time can be reduced by a half-hour or more by eliminating the need for secondary responders to travel to the incident scene to make an on-scene assessment of the equipment and personnel needed for clearance.

In New York City, police typically are the first to arrive at the scene of a

Seattle Washington CAD-CARS Project slide show (PDF, HTML)

highway incident. The police notify other first responders as well as NYCDOT. The transportation agency's standard procedure is to dispatch a field supervisor to assess the scene, in order to determine the personnel and equipment needed for clearance, recovery, and infrastructure repair (such as, towing and recovery vehicles, sanitation or hazmat equipment). An average of 30 minutes of travel time is required for the field supervisors to reach the incident scene. Yet another half-hour typically is required for the second responders to navigate through traffic and to reach the scene.

Over-responding can be expensive, especially when overtime is a consideration. Over-responding also may limit the availability of emergency crews and equipment needed elsewhere.

With the IIMS, field supervisors are able to manage clearance, recovery and repair operations from the NYCDOT Transportation Management Center (TMC). The IIMS transmits images from the incident scene, along with precise location information produced by a Global Positioning System (GPS) integrated with a Geographic Information System (GIS), and incident data entered into the IIMS by the responding officer on scene. By viewing the images and reviewing the IIMS data, field supervisors can quickly assess the situation and dispatch the appropriate type and quantity of response units.

Transportation officials can't rely blindly on information radioed in by first responders at the scene. Also, over-responding can be expensive, especially when overtime is a consideration. Over-responding may limit the availability of emergency crews and equipment needed elsewhere. Depending on the type of incident and the nature of its impact on the infrastructure, different crew expertise is required. The incident images the field supervisors confidence in their remote dispatch decisions.

GPS More Reliable Than Voice Location

The location information provided by the IIMS also is very valuable, according to Nelson Castillo, Assistant Deputy Commissioner and Director of Communications, NYCDOT Office of Emergency Response. "GPS tells you right to the lane what needs to be closed off," Castillo said. "Voice reports aren't always that accurate, and we often get conflicting reports from passersby, the police, and the DOT. For example, we had an incident where the IIMS images enabled us to see that an incident reported on a freeway actually was on the ramp."

In the van rollover incident shown below, IIMS allowed NYCDOT to accurately locate the incident on an arterial street rather than on the highway as first reported. The van had rolled off the highway overpass on to the street below. The photos also helped NYCDOT to accurately determine the equipment needed to clean the roadway, and to determine the best approach direction for reaching the incident. Shown below is an IIMS screen capture showing how the incident images and data appeared to users during the rollover incident.

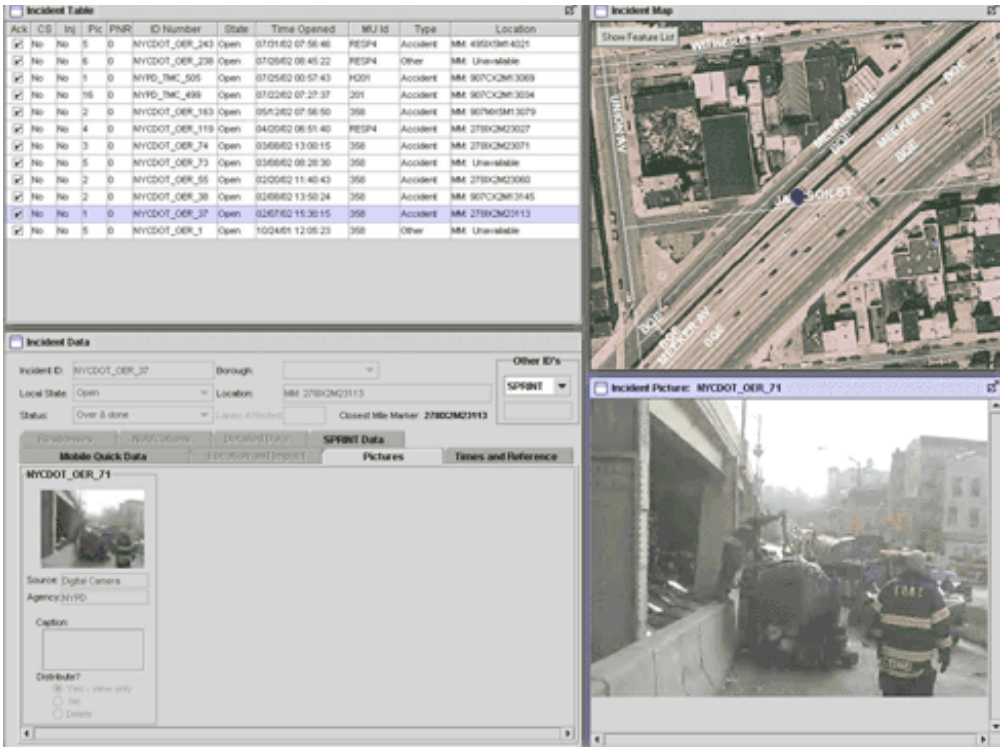

Figure 2. Van rollover incident occurred on the freeway, but the van rolled on to an arterial street below. IIMS enabled NYCDOT to immediately and accurately locate the incident and clear the street more quickly.

IIMS Delivers Congestion Mitigation, Improved Safety and Enhanced Emergency Response

IIMS is designed to support interagency coordination of response to incidents ranging from minor roadway fender-benders to major emergencies. The IIMS project was initiated in 1999 by NYSDOT Region 11, and initially funded through the Environmental Protection Agency's Congestion Mitigation and Air Quality (CMAQ) program with the goals of reduced congestion, improved safety and mobility, and increased efficiency and productivity.

The USDOT funding support, provided through the Intelligent Transportation Systems (ITS) Public Safety Program, provides for Field Operational Test (FOT) evaluation, outreach to the Public Safety and ITS communities, and support of ITS standards development and testing.

The major benefits of the IIMS include:

- More accurate, complete, and up-to-the-minute incident information, which benefits the public as well as responding agencies;
- Real-time sharing of photos, data and other initial incident management information by all incident response agencies and centers, which is important for staging and guiding subsequent response support tasks;
- Reduced traffic congestion and secondary incidents due to faster roadway clearance; and
- More efficient use of emergency resources due to reduced incident response time. Staff time and overtime hours are used more effectively because the right type and amount of equipment and staff is sent to each incident, and the need to dispatch supervisors often is eliminated.

While initial anecdotal assessments indicate that IIMS works well and is able to facilitate secondary response, a more formal evaluation is necessary to quantify benefits.

Performance Evaluation Will Quantify Benefits

A team of independent evaluators, funded by DOT, will study the effectiveness of the IIMS in:

- Reducing the time traffic is disrupted due to traffic incidents; and
- Reducing the dispatch of unneeded resources.

The evaluators will attempt to determine how IIMS system performance may vary by incident type. Evaluation began in 2002 and will continue through 2003.

IIMS Demonstrates Effective Operational Partnerships Between Public Safety and Transportation Agencies

Responses to highway incidents and off-road emergencies require services from many agencies. These responses range from initial life-saving emergency medical services to less time-critical clean-up and roadside infrastructure repair services.

Turf battles stemming from differing agency missions can form a seemingly insurmountable barrier to coordinated and cooperative incident response. The IIMS project partners are proving that these institutional barriers can be overcome.

Led by the initial project sponsors, New York State Department of Transportation (NYSDOT), the IIMS was initially tested at emergency response and operations centers with data provided from 24 response vehicles owned by the:

- New York City Police Department (NYPD) and the
- New York City Department of Transportation (NYCDOT).

Additional funding from the U.S. Department of Transportation's (DOT's) ITS Public Safety Program made it possible to add additional participating agencies in the fall of 2002, including the:

- New York City Department of Environmental Protection (NYCDEP), and the
- New York City Department of Sanitation (NYC-DOS).

The linking of the public works operations centers is intended to demonstrate the benefit of integrating first and secondary emergency response as part of a coordinated multi-agency incident management program.

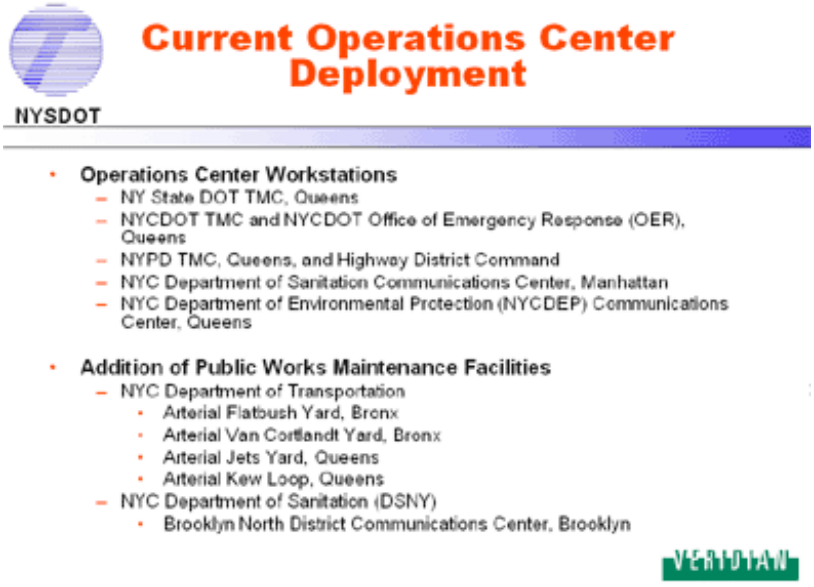

Figure 3. Operations Centers and Maintenance Facilities Participating in IIMS Field Test (January 2003).

Several other New York City agencies also are supporting the operational test and will be involved in operational testing in Phase II of the project (2003 and 2004). These agencies include the:

- New York City Fire/EMS Department (FDNY/EMS)
- Metropolitan Transportation Authority—New York City Transit (MTA-NYCT),
- New York City office of Emergency Management (NYC-OEM), and the
- Metropolitan Transportation Authority—Bridges and Tunnels.

IIMS supports regional decision-making and coordination by providing a range of information for post-incident analysis. This, in turn, supports interagency planning.

IIMS Design and Configuration

IIMS relies on a distributed architecture. Servers are interconnected in peer-to-peer relationships, while workstations are connected to servers in a client/server relationship. An advantage of this distributed architecture is that the system is not dependent on any single center's server. If one center goes down, other centers can continue to operate. The IIMS utilizes Local Area Networks, Wide Area Networks (WAN) and Cellular Digital Packet Data (CDPD) for interconnection of servers and workstations. Wide Area Networking is accomplished with frame relay circuits and permanent virtual circuits. Wireless networking is accomplished with CDPD. Local area networking is accomplished with Ethernet. Figure 4 shows the IIMS network configuration.

Details of the IIMS design, including a discussion of the landline and wireless network components, data communication and storage implementation, and the approaches for achieving data security, are described in a recent paper, "IIMS, An Operational Test of a Multi-Agency System for Coordinating Incident Responses," published in *ITS America 12th Annual Meeting and Exposition Conference Proceedings*, May, 2002.

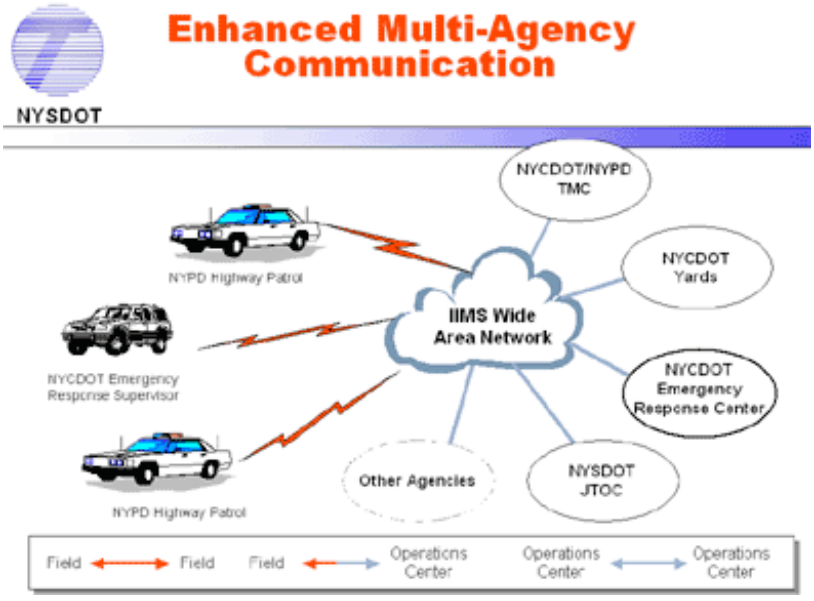

Figure 4. IIMS Wide Area Network Configuration

At this writing (January 2003), 23 vehicles were equipped with IIMS:

- 19 New York City Police Department Dedicated Mobile Highway Response Units in the Bronx, Brooklyn, Queens and Staten Island;
- 4 Second Response Mobile Highway Response Units owned by NYCDOT and NYSDOT

The vehicles have wireless remote laptops equipped with IIMS incident data collection and management software, and GIS mapping capability integrated with a Global Positioning System (GPS). The GIS/GPS instantly locates the incident on a detailed GIS map. Each vehicle has a surveillance video camera as well as a digital camera. Still frames of the incident scene are captured from the video camera and integrated into the incident report. The mobile digital camera may be used to provide additional images of the scene. The NYPD radio frequency is used for voice communication.

Figure 5. Twenty-three emergency response vehicles are equipped with wireless remote laptop computers, video cameras and digital cameras.

The first officer on scene is prompted by the user-friendly software to enter text and numeric incident scene data that will enable the selection of proper responders and equipment for clearance. In addition to the digital images and GPS/GIS location information, the system collects and shares incident descriptive data, lane closure data, and incident response status.

IIMS Is Integrated With Legacy Systems

In many cities, law enforcement and transportation agencies perceive the existence of legacy systems and equipment as a major barrier to integration of public safety and transportation communication. The IIMS is demonstrating that system integration barriers can be overcome.

The IIMS is being integrated with the New York Police Department (NYPD) in-vehicle cameras and the New York City Department of Transportation (NYCDOT) Motorist Interchange Communication Environment (MICE) resource management system. Future plans call for integration of IIMS with the new NYPD Computer-Aided Dispatch (CAD) system, which is scheduled to be operational in 2003-2005.

IIMS Built on National ITS Architecture, Conforms With ITS Standards

Because IIMS is designed for integration with other systems, it builds on the foundation of the National ITS Architecture and conforms with relevant evolving ITS Standards, particularly the

- Institute of Electrical and Electronic Engineers (IEEE) Standard 1512 *Standard for Common Incident Management Message Sets for Use by Emergency Management Centers, and*

- National Transportation Communications for ITS Protocol (NTCIP).

The deployed Phase I IIMS supports two types of centers—Traffic Management Centers and Emergency Management Centers—and Emergency Vehicles, as defined by the National ITS Architecture. IIMS serves the functions and data flows within the Emergency Response (EM1) and Incident Management System (ATMS8) Market Packages. During Phase 2, IIMS will be expanded to also support Transit Management Centers.

Table 1 shows how IIMS components map to these National Architecture elements.

Table 1. IIMS Inventory Mapping to ITS National Architecture

Agency	Center	Status	National ITS Architecture Entity
NYC Department of Transportation (DOT)	Emergency Response Center	Existing	Emergency Management (Subsystem)
	Transportation Management Center (TMC)	Existing	Traffic Management (Subsystem)
	Supervisor Vehicles (3 vehicles)	Existing	Emergency Vehicle (Subsystem)
	Motorist Interchange Communications Environment (MICE)	Existing	Archived Data Management (Subsystem)
NYC Police (NYPD)	Highway Patrol Vehicles (19 vehicles)	Existing (expands to 21 in 2003)	Emergency Vehicle (Subsystem)
	Traffic Management Center (TMC)	Existing	Emergency Management (Subsystem)
NYS Department of Transportation (DOT)	Joint Transportation Operations Center (JTOC)	Existing	Emergency Management (Subsystem)
NYC Department of Transportation (DOT)	Yard/Dispatch (4 locations)	Existing	Emergency Management (Subsystem)
NYC Police (NYPD)	Headquarters (One Police Plaza)	Planned (2003)	Emergency Management (Subsystem)
	Highway District Command	Existing	Emergency Management (Subsystem)
	NYPD HELP Vehicles	Planned (2003)	Emergency Vehicle (Subsystem)
	NYPD CAD System	Future	Emergency Management (Subsystem)
NYC Department of Sanitation	Operations Center	Existing	Emergency Management (Subsystem)

	Yard/Dispatch (1 locations)	Planned (2003)	Emergency Management (Subsystem)
NYC Fire/EMS	Operations Management Center (several locations)	Planned (2003)	Emergency Management (Subsystem)
MTA NYC Transit	Transit Management Center	Planned (2003)	Transit Management (Subsystem)
NYC Department of Environmental Protection (DEP)	Operations Management Center	Existing	Emergency Management (Subsystem)
NYC Office of Emergency Management (OEM)	Office Operations Center (EOC)	Planned (2003)	Emergency Management (Subsystem)
NYC MTA Bridges and Tunnels	Operations Center	Planned (2003)	Emergency Management (Subsystem)

Do Any Other Cities Have Similar Systems?

IIMS is the only public safety/transportation incident information system currently in operation that transmits and shares real-time location, photographic, and text information between and among field units and operations centers. However, a number of jurisdictions are currently investigating public safety/transportation information-sharing opportunities, and some are conducting pilot or test projects.

For example, the Capital Wireless Integrated Network (CapWIN) recently completed a successful proof-of-concept pilot that included installation of mobile computers in 22 transportation, law enforcement, and fire vehicles across state lines (Maryland, Virginia and the District of Columbia) in the national capital region. The geographic area of the pilot project was the Woodrow Wilson Bridge, which links Maryland and Virginia across the District of Columbia's portion of the Potomac River on Interstate 95. The pilot demonstrated vehicle-to-vehicle message capabilities as well as shared access of state law enforcement databases for authorized law enforcement agencies.

CapWIN is an Intranet-based system. Current plans call for expansion of the system to provide an integrated interoperable mobile data platform for transportation and public safety agencies in Maryland, Virginia, and the District of Columbia in the 2002-2003 time frame.

For more information, see the CapWIN web site

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Weather and Highways

Report of a Policy Forum

Developed by the

Atmospheric Policy Program
American Meteorological Society

Study Series Underwriters

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Engineered for life

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Federal Highway Administration
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CONTENTS

BACKGROUND MATERIALS MAY BE FOUND ON THE INTERNET
[URL: www.ametsoc.org/atmospolicy]

Any opinions, findings, and conclusions or recommendations expressed in this report do not necessarily reflect the views of the series underwriters or study supporters.

Cover Image – Credit and Copyright: Milwaukee Journal Sentinel - An accident on U.S. Highway 41, just north of county Highway Q in Germantown, Wisconsin
Photographer: Michael Sears

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PREFACE

This report of a policy forum on "Weather and Highways" presents recommendations that, if implemented, could offer considerable benefits to the safety of the nation's traveling public and the national economy by supporting the effective application of weather information services to the operation of our road systems.

The AMS Atmospheric Policy Program developed this forum to address the issues connected with effective use of road weather information. The participants included nearly 100 public, private, and academic representatives of weather information providers; transportation managers and users; and policy makers knowledgeable about the nation's highway system. We remain poised to assist in the further development and realization of the recommendations that have emerged from the forum.

The AMS Atmospheric Policy Program acknowledges, with thanks, the contributions of numerous individuals and organizations to the success of the forum. The fact that they were so numerous inhibits my ability to name them all. The planning committee (Gina Eosco, Genene Fisher, William Mahoney, and Leland Smithson) guided me throughout the forum development process from the initiation to the development of the final report. Of course, the forum could not have been undertaken without the generous labors of the moderators and panelists. The Federal Highway Administration and the National Science Foundation provided support for this forum and ITT Industries and Raytheon provide underwriting support to the AMS Policy Study Series, of which this forum is an undertaking.

Gina Eosco and Carolyn McMahon, AMS staff, very ably handled all of the logistical and administrative details involved in the forum. We are grateful for the efforts of Mark Fernau and R. Gary Rasmussen of the AMS who documented the main outcomes of the discussions. In the course of the review of the initial drafts, several forum participants, too numerous to mention, offered comments and suggestions that influenced the text in the final report. However, the services of William Mahoney, who contributed significantly to the final report, deserve special mention.

Finally, I want to especially acknowledge the outstanding efforts of Genene Fisher, Policy Fellow, AMS Atmospheric Policy Program who, not only was the primary planner of the forum, but was also the principal editor of the report.

Richard S. Greenfield
Senior Policy Fellow and Associate Director
Atmospheric Policy Program
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EXECUTIVE SUMMARY

The United States, and more specifically its economy, is highly dependent on the national highway system. More than 200 million cars and trucks use the national highway system and critical parts function at or near their maximum capacity much of the time (OFCM, 2002). About 77% (by weight) of domestic freight shipments are by truck (versus other modes of transportation). Adverse weather, including rain, snow, sleet, fog, etc., can easily reduce roadway capacity and significantly affect the efficiency of this system. Weather also plays a critical role in highway safety. In the United States each year, approximately 7,000 highway deaths and 800,000 injuries are associated with poor weather driving conditions. The estimated annual economic cost from these weather-related crashes (deaths, injuries, and property) amounts to nearly $42 billion (Lombardo, 2000). Weather is a factor in about 28% of the total crashes and 19% of the total fatalities. It is clear that the societal and economic impacts of adverse weather on the highway system are huge.

The traveling public is the ultimate user of the road transportation system. People rely on the system as commuters, tourists, and consumers. In addition, police, fire fighters, school transportation systems, and emergency medical service providers, along with many others, rely on the transportation system to meet the vital needs of the public. Travelers are quite aware of the impact of weather on the roadway system. A Gallup public opinion poll conducted in 2002 indicated that 40% of the potential users of the national "511" system identified weather and road condition as the most important information element (ITSA, 2002). The public clearly understands the relationship between weather and highway safety and congestion, and they seek solutions to enhance mobility.

Given the enormous impact weather has on the highway system and the potentially huge safety and economic benefits that could be realized if weather information was used more effectively by road operating agencies and the public, why has it not received the attention it deserves? What has or has not been done to promote road weather services, what opportunities are emerging, and what impediments are in place that have slowed progress to date? What policies, if any, are needed at the federal and/or state levels?

In an effort to discuss responses to these questions, the Atmospheric Policy Program of the American Meteorological Society (AMS) developed a forum to foster vigorous policy level dialogues. These dialogues led to recommendations on how to improve the safety and operations of the nation's highway system through better application of weather information. The forum brought together representatives of the weather information providers; transportation managers and users; and policy makers knowledgeable about the nation's highway system. The representatives were drawn from the public and private sectors at the national, state, and local levels.

The forum took place over a two-day period on 4-5 November 2003 in Washington, DC. It consisted of three panel discussions focused on 1) present and near-term potential in providing weather information to improve the highway system, 2) public and industrial development of strategies to effectively respond to weather information, and 3) policy issues in implementing effective application of weather services to the management of the nation's highway system. Each panel was followed by a period of discussion leading to recommendations. The panelists' position papers, along with a policy white paper prepared for the forum, are available on the AMS Website at http://www.ametsoc.org/atmospolicy.

The forum discussions led to the following six recommendations, of which two are overarching. All recommendations are directed at improving the safety and efficiency of the roads for the ultimate benefit of the traveling public.

OVERARCHING RECOMMENDATION: NATIONAL ROAD WEATHER RESEARCH, DEVELOPMENT, AND APPLICATIONS PROGRAM

1. Congress should authorize and provide long-term funding for the appropriate federal agencies to develop a *national road weather research, development, and applications program*, to improve the application of weather information for highway safety and operations.

The program should:

- be a multi-faceted interdisciplinary road weather research program focused on addressing the needs of road operating agencies and the traveling public;
- be designed to support the operational decision making process of the traveling public and operational personnel involved in traffic, incident and emergency management, construction, and maintenance activities;
- include technology transfer components that provide mechanisms for the resulting technologies to be applied nationally in a timely manner;
- result in technologies that are consistent with and complimentary to the Intelligent Transportation System (ITS) architecture and framework;
- be designed for drivers and transportation managers to take advantage of and augment current and emerging transportation technologies including intelligent vehicles, telematics, mobile sensing systems, 511 systems, dynamic navigation systems; and
- include mechanisms, such as rapid prototyping and model deployments, to assess user feedback and the potential benefits of the new technologies.

OVERARCHING RECOMMENDATION: COORDINATION OF PUBLIC, PRIVATE, AND ACADEMIC SECTORS

2. The federal and state departments of transportation should closely coordinate with public, private, and academic sector road weather stakeholders to improve the safety and efficiency of the nation's highway system during adverse weather.

The coordinated activities should include:

- aggressively reviewing and quickly implementing, where appropriate, currently available weather and ITS technology to highway operations—in particular, technology that responds to weather conditions (e.g., variable message signs, dynamic speed limits, ramp metering, and road condition information kiosks);
- promoting the use and expansion of road weather and road condition measurement and information systems;
- developing and applying national standards for Road Weather Information Systems (RWIS) that include accuracy, data format, and siting requirements; and
- working with organizations (e.g. AAA and AMS) to implement programs of education and public awareness, including effective driver education programs that provide instruction on appropriate driving responses to hazardous weather and better utilization of advanced automotive capabilities.

DATA INFRASTRUCTURE

3. DOT/FHWA and NOAA, working with state DOTs, should establish a national road weather and road condition data collection, processing, and dissemination infrastructure to improve the safety and efficiency of the roadway system.

The infrastructure should be designed to ensure:

- the open two-way exchange of relevant transportation data and practices between weather and transportation industry stakeholders;
- that national standards are established and used for weather, traffic, and road condition measurement systems and that open system formats and protocols (e.g., NTCIP) are adhered to;
- that quality control methods and techniques are applied to the data;
- that it can take advantage of existing weather information and warning technologies (e.g., NOAA Weather Radio) and future communication networks (e.g., telematics); and
- that data are collated on a national level and made available centrally on a non-exclusive basis.

OBSERVATIONS, FORECASTS, AND DELIVERY OF ROAD WEATHER INFORMATION AND SERVICES

4. NOAA/NWS, commercial weather providers, and weather information users should work cooperatively to improve the observation system, develop and improve forecasts, and enhance the delivery of information and services on road weather.

Road weather observational and forecast improvements should focus on:

- boundary layer and near-surface meteorology (0-3 meters above ground level) where travelers generally experience road weather hazards (fog, ice, snow, hail, heavy precipitation, blowing snow, etc.);
- collecting and distributing observational data (e.g., ASOS, AWOS, RWIS) with sufficient temporal resolution (minutes) to support tactical decision making;
- distributing weather prediction datasets with sufficient time resolution (hourly), spatial resolution (1-10 km), and data elements needed to analyze and predict pavement conditions;
- road (and bridge) condition prediction models and characterization of the pavement surface;
- developing and implementing probabilistic weather products tailored for the road weather risk management decision process;
- developing new-generation weather and pavement condition sensors to improve the measurement of parameters critical to support roadway operations; and
- making output (data and products) understandable and relevant for highway decision makers and the traveling public.

USER TRAINING AND ROAD WEATHER EDUCATION

5. Federal and state DOTs should train the road management community to more effectively integrate weather into the decision process. In addition, the atmospheric science community, particularly academia, should develop course curricula focusing on road weather science and engineering.

Training and education programs should:

- be focused on educating transportation decision makers (traffic, incident, and emergency management, construction and maintenance personnel) and the automobile industry to improve their understanding of weather hazards and the impact of those hazards on the transportation system;
- be developed at universities to ensure that an adequate pool of qualified “road weather” meteorologists exists to service the surface transportation community; and
- train weather information providers on the needs/challenges of the surface transportation community.

IN-VEHICLE ROAD WEATHER INFORMATION

6. DOT/FHWA should provide incentives for vehicle manufacturers and highway engineers to raise public and private sector demand for in-vehicle road weather information.

Specifically, the incentive program should include:

- support for research and development, benefit analyses, and human factors studies of in-vehicle weather and road condition information systems;
- FHWA and state DOT participation in prototyping activities, field demonstrations and model deployments of new in-vehicle information systems; and
- support for the development of promotional campaigns describing the safety and mobility benefits of utilizing in-vehicle weather and road condition information technologies.

Meaningful actions in response to these recommendations will require cooperative efforts by federal, state, and local DOTs; transportation decision makers; academia and research centers; and weather information providers. Leadership by the U.S. DOT, in cooperation with NOAA and NSF, with support from Congress, is vital if these recommendations are to be successfully applied to improve the safety and efficiency of our nation's roads.

I. INTRODUCTION

The United States, and more specifically its economy, is highly dependent on the national highway system. More than 200 million cars and trucks use the national highway system and critical parts function at or near their maximum capacity much of the time (OFCM, 2002). About 77% (by weight) of domestic freight shipments are by truck (versus other modes of transportation). Adverse weather can easily reduce roadway capacity and significantly affect the efficiency of this system. Weather also plays a critical role in highway safety. In the United States each year, approximately 7,000 highway deaths and 800,000 injuries are associated with poor weather driving conditions. The estimated annual economic cost from these weather-related crashes (deaths, injuries, and property) amounts to nearly $42 billion (Lombardo, 2000). Weather is a factor in about 28% of the total crashes and 19% of the total fatalities. It is clear that the societal and economic impacts of adverse weather on the highway system are huge.

The traveling public is the ultimate user of the road transportation system. People rely on the system as commuters, tourists, and consumers. In addition, police, fire fighters, school transportation systems, and emergency medical service providers, along with many others rely on the transportation system to meet the vital needs of the public. Many goods and services are based on just-in-time delivery, and so disruption in mobility brings considerable negative economic impact. Weather can no longer be considered an inevitable inconvenience. Fortunately, there are many commercial off-the-shelf technologies and service improvement techniques available now that, if implemented, could reduce the loss of lives and improve the operational efficiency and carrying capacity of our highways. A Gallup public opinion poll conducted in 2002 indicated that 40% of the potential users of the national “511” system identified weather and road condition as the most important information element (ITSA, 2002). The public clearly understands the relationship between weather and highway safety and congestion and wants solutions to enhance mobility.

The nation’s roads are operated and maintained by a variety of transportation managers, including traffic managers, maintenance managers, and emergency and public safety managers. These managers, along with the traveling public, receive weather information from the private sector (also known as commercial weather providers) and public sector sources.

Today, the nation’s highways and roads present many challenges. For example, the U.S. highway system is extremely decentralized. The system is owned and managed by the 50 states and tens of thousands of local governments. This decentralization creates obvious challenges with respect to maintaining consistency across the system and to transferring new technologies into nationwide use. Judiciously applied increased highway funding would allow states to keep pace with the growth in demands for increased capacity, better environmental mitigation, and improved system management. Without certain increases, highway agencies are unable to often compete with the long-standing desire to add lane miles even though technologies designed to improve system performance and management capabilities often cost far less.

Given the enormous impact weather has on the highway system and the potentially huge safety and economic benefits that could be realized if weather information was used more effectively by road operating agencies and the public, why has it not received the attention it deserves? What has or has not been done to promote road weather services, what opportunities are emerging, and what

impediments are in place that have slowed progress to date? What policies, if any, are needed at the federal and/or state levels?

In an effort to discuss responses to these questions, the Atmospheric Policy Program of the American Meteorological Society (AMS) developed a forum to foster vigorous policy level dialogues. These dialogues led to recommendations on how to improve the safety and operations of the nation's highway system through better application of weather information. The forum brought together representatives of the weather information providers; transportation managers and users; and policy makers knowledgeable about the nation's highway system. The representatives were drawn from the public and private sectors at the national, state, and local levels.

The forum took place over a two-day period on 4-5 November 2003 in Washington, DC. It consisted of three panel discussions focused on 1) present and near-term potential in providing weather information to improve the highway system, 2) public and industrial development of strategies to effectively respond to weather information, and 3) policy issues in implementing effective application of weather services to the management of the nation's highway system. Each panel was followed by a period of discussion leading to recommendations. There was a final discussion among a subset of the panelists, moderators, and forum planners and staff on the day after the close of the forum. A draft report was circulated to the panelists, moderators, and all participants for comments.

Each panel was composed of public and private sector experts in their respective topic areas. The forum program is provided in Appendix A. The names, affiliations, and addresses of the moderators and panelists are available in Appendix B. A list of the participants is provided in Appendix C.

The panelists' position papers, along with a policy white paper prepared for the forum, are available on the AMS Website at http://www.ametsoc.org/atmospolicy.

The forum discussions resulted in a set of recommendations that pertain to improvements in the provision of weather services for highway operations and the traveling public. These recommendations are presented in Section II.

Over the last several years, much progress has been made in bringing together the surface transportation and weather community. The Intelligent Transportation Society of America (ITSA) established a Weather Information and Applications Task Force in 1996. The FHWA, working with state DOTs and national laboratories developed Surface Transportation Weather Decision Support Requirements (STWDSR) in 2000. The Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) worked with transportation stakeholders and developed the *Weather Information for Surface Transportation National Needs Assessment Report*, which was published in December 2002. The AMS had an Ad Hoc Committee on Surface Transportation in the mid-1990s. The AMS more recently created a Standing Committee on ITS and Surface Transportation Weather in 2002. In January 2004, the National Research Council (NRC) completed a study and published a report titled *Where the Weather Meets the Road: A Research Agenda for Improving Road Weather Services,* which describes a research agenda for improving road weather services. In parallel with these efforts, the FHWA Road Weather Management Program has been actively engaging the meteorological community through projects designed to address the needs of highway operations decision makers. All of this activity demonstrates a deep appreciation for the

impact of weather on the roadway and the need to move ahead aggressively with a program plan designed to improve the performance of the transportation system during adverse weather.

There is an ongoing discussion in the road weather community about how a research, development, and applications program should be organized. Should it be organized around weather phenomena (winter storms, thunderstorms, surface winds, etc.) or decision categories (winter road maintenance, traffic management, emergency management, etc.)? Should regional transportation weather research centers be created around the country to perform the work or should technology development teams be established to focus on specific research topics? What organizations should be involved and who should take the lead? Before a national road weather research, development, and applications program is initiated, these questions must be answered.

II. RECOMMENDATIONS AND SUMMARY DISCUSSIONS

The forum discussions led to the following six recommendations, of which two are overarching. All recommendations are directed at improving the safety and efficiency of the roads for the ultimate benefit of the traveling public.

OVERARCHING RECOMMENDATION: NATIONAL ROAD WEATHER RESEARCH, DEVELOPMENT, AND APPLICATIONS PROGRAM

1. Congress should authorize and provide long-term funding for the appropriate federal agencies to develop a *national road weather research, development, and applications program*, to improve the application of weather information for highway safety and operations.

Specifically, the program should:

- be a multi-faceted interdisciplinary road weather research program focused on addressing the needs of road operating agencies and the traveling public;
- be designed to support the operational decision making process of the traveling public and operational personnel involved in traffic, incident and emergency management, construction, and maintenance activities;
- include technology transfer components that provide mechanisms for the resulting technologies to be applied nationally in a timely manner;
- result in technologies that are consistent with and complimentary to the Intelligent Transportation System (ITS) architecture and framework;
- be designed for drivers and transportation managers to take advantage of and augment current and emerging transportation technologies including intelligent vehicles, telematics, mobile sensing systems, 511 systems, dynamic navigation systems; and
- include mechanisms, such as rapid prototyping and model deployments, to assess user feedback and the potential benefits of the new technologies.

To successfully meet the needs of the surface transportation community (as reported in the OFCM *Weather Information for Surface Transportation--A National User Needs Assessment*), a coordinated road weather research and applications program needs to be established at the national level. The program must be adequately funded and must include research, development, implementation, verification, training, outreach, and education. It must cut across multiple transportation operations categories and involve stakeholders. The recent NRC report, *Where the Weather Meets the Road: A Research Agenda for Improving Road Weather Services,* lays out many of the necessary components of a national road weather research program (NRC, 2004).

In implementing this recommendation, Congress should fund the FHWA to lead the development of this program. The FHWA should closely coordinate the program with the National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation (NSF), the appropriate